



Cavitation Technology for Yoghurt Processing

A NEXT GENERATION MICROSCOPIC MIXING AND SCALE FREE HEATING TECHNOLOGY

The latest hydrodynamic cavitation technology enables efficient processing of yoghurt. SPX has particular expertise in fresh fermented dairy products (FDP) processing and the APV Cavicator™ ensures high quality smoothing, highly efficient hydration and functionalization, controllable scale-free heating, and effective aeration of products

With the rising global demand for high protein, low fat Greek style and drinkable yoghurts, the yoghurt category is a fast growing segment in FDP processing. Market trends are being driven by many factors including a growing youth population and increased spending power in emerging markets. The product categories that incorporate yoghurt are also expanding, as condiments, bakery and confectionary, and health care utilise yoghurt-based ingredients. The dairy nutrition cross over into the high-growth nutritional beverage market is a further trend that promotes yoghurt products. The evolution of the yoghurt market is further driven by consumer demand for nutritional products that are natural, functional, healthy, tasty and convenient. Combined with a highly competitive market place and environmental pressures, new and innovative processing technologies are needed.

SPX Technology for Yoghurt Processing

As a leading provider of innovative process equipments for the production of yoghurt and FDP, SPX's food technologists are constantly focussing on new ways to support customers with the modern challenges they are facing. SPX's solution portfolio includes all process line equipment from milk intake to filling machines and even partnerships with filling line providers. Supported by leading Innovation Centres, SPX has proven ability in helping customers develop and produce many types of yoghurt from spoonable or set types to high protein variants, desserts, ingredients yoghurt categories, yoghurt based beverages and ESL/long life products.



Hydrodynamic Cavitation Technology

Hydrodynamic cavitation technology uses a rotor with precisely machined cavities spinning in a liquid chamber that generates controlled cavitation. The process generates and collapses bubbles due to the decrease and then increase in pressure produced. As the bubbles collapse, a very powerful energy wave (shockwave) is released into the surrounding liquid. This cavitation shockwave creates a very efficient, microscopic mixing effect along with friction that generates controllable, scale-free heating.

The APV Cavicator™, shown in Fig. 1, has multiple applications (Table 1) in pre-treatment and conditioning of the yoghurt milk, smoothing of high protein yoghurt and fresh cheese types, hydration and functionalization of ingredients, scale free heating and aeration. The microstructural conditioning and functionalization it performs can unlock the natural functional properties from whey proteins that can improve yoghurt viscosity, texture, stability and taste in low or non-fat nutritional products.



Fig. 1: APV Cavicator



Fig. 2: High protein yoghurt sports drinks

Microparticulation for nutritional Beverages

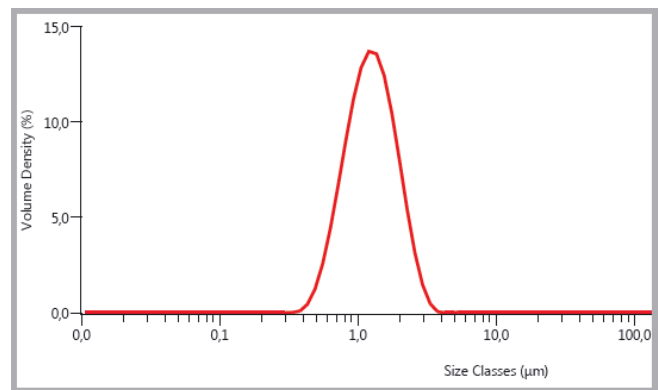
The well-known APV LeanCreme™ technology for Microparticulation of WPC provides functional ingredients or low fat cheese, yoghurt and nutritional dairy beverage (yoghurt drinks) and others. An example of this application is the production of Skyr Yoghurt drink (Fig. 2) made by MS Iceland Dairies in Akureyri. It replaces the use of milk with microparticulated WPC producing a sports protein drink based on 100% LeanCreme with a protein content of 8.9%.

The multi-purpose CaviMaster™ technology combines the benefits of the Cavitator and LeanCreme systems and produce high functional microparticulate with very narrow particle size distribution of 1-1.5 micron (Fig. 3). The cavitation technology can improve existing processes and end products, as well as facilitate the production of high value yoghurt products with low fat and high nutritional whey proteins. Sweet whey and lactic acid whey acidified with yoghurt cultures, or ideal whey from milk fractionation can be used as the whey source and products can be based on liquid or recombined powder WPC of various grades.

Summary

SPX continues to research and develop solutions that deliver clear customer benefits – enhancing productivity, production flexibility, efficiency and sustainability. It has detailed understanding of FDP applications, food safety and hygiene requirements. The CaviMaster is one of its latest innovations, combining the proven benefits of the APV LeanCreme and Cavitator systems.

Controlled hydrodynamic cavitation offers many benefits and versatility in the growing yoghurt market. The scale free heating it provides is ideal for use with high fouling products and can increase running time and reduce required CIP cycles. It provides excellent microscopic mixing and dispersion with efficient hydration and emulsification. Overall this reliable, low maintenance technology offers real potential to further reduce operational costs and provide high-end quality products.



Particle size distribution of functionalised WPC

Fig. 3: Microparticulation based on CaviMaster technology

Key applications	Key process / product benefits
Pre-treatment and conditioning of the yoghurt / FDP milk	Heath denaturation and cavitation force enhance viscosity / texture and taste and stability of the products.
Smoothing of FDP / yoghurt	Gentle smoothing to eliminate grainy structure and syneresis especially for high protein yoghurts.
Powder Mixing and Hydration	Fast dissolving of dairy powder ingredients and gums at decreased temperature and increased solids.
WPC functionalization	Microparticulation of WPC to enhance functional properties in low fat and or protein-enriched nutritional products.
Scale-free heating	Pasteurization of protein drinks without fouling for enhanced run time and decreased operational cost.
Aeration of FDP / yoghurt desserts	Aeration of yoghurt mousse desserts. Possibly carbonation of yoghurt drinks.

Table 1: Cavitator technology applications and benefits



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